Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (original) An embedded attenuated phase shift mask comprising a translucent substrate, an embedded phase shift layer comprised of phase shifting and attenuating material overlaying the substrate, and a layer of opaque material over laying the embedded phase shift layer, wherein

areas of the opaque material have been removed to define a circuit pattern; and within the areas of the removed opaque material,

first regions of the embedded layer of are completely removed,

second regions of the embedded layer are thinned to a predetermined height equivalent to a predetermined level of attenuation, and

regions of the substrate adjacent the second regions of the embedded layer are etched to a predetermined depth such that radiation passing through the second region of the embedded phase shift layer is phase shifted a predetermined amount with respect to radiation passing through the first region.

2. (original) The embedded attenuated phase shift mask of claim 1 further comprising a plurality of test cells, wherein at least one of the plurality of test cells has first attenuation and the second one of the plurality of test cells has a second attenuation different from the first.

3. (original) The embedded phase shift mask of claim 1 further comprising a plurality of test cells, wherein at least one of the plurality of test cells has first phase shift and the second one of the plurality of test cells has a second phase shift different from the first.

4. (original) A method for fabricating an embedded attenuated phase shift photomask, the photomask including a substrate, an embedded phase shift layer of known thickness and an opaque layer, the method comprising:

completely removing in first regions of the photomask the phase shift layer;

removing to a predetermined depth in the first region the substrate underlying the removed first regions of the phase shift layer; and

thinning in second regions of the photomask the phase shift layer to achieve a predetermined attenuation for radiation passing through the second regions;

whereby the relative phase shift between radiation passing through first regions and the second regions is equal to a desired phase shift.

5. (original) The method of claim 4, wherein the completely removing the phase shift layer and removing to a predetermined depth areas of the substrate are undertaken during the same etching process.

6. (original) The method of claim 4, wherein

in the second regions, the phase shift layer is thinned by an etching process that also removes an additional amount of the substrate in the first regions; and

the predetermined depth is chosen such that, after the additional amount of the substrate is removed during thinning of the phase shift layer, the total depth of the

removed substrate in the first region causes a predetermined relative phase shift between radiation passing through the first and second regions.

7. (original) The method of claim 4, wherein thinning the phase shift layer includes an etching process to remove material from the phase shift layer, and wherein a time for the second etching of the phase shift layer is chosen based on the predetermined attenuation.

8. (original) The method of claim 7, wherein the etching process removes additional amounts of the substrate in the first regions, and wherein the predetermined depth is determined such that, after removal of an additional amount of the substrate during etching of the phase shift layer, the total depth of the removed substrate in the first region causes a predetermined relative phase shift between radiation passing through the first and second regions.

9. (original) An apparatus comprised of a embedded attenuated phase shift mask, the embedded attenuated phase shift mask including a substrate, an embedded phase shift layer and an opaque layer, the embedded phase shift mask having fabricated thereon a plurality of test cells, wherein a first one of the plurality of test cells has exposed regions of the embedded phase shift layer adjacent to unattenuated feature regions having a first attenuation and a second one of the

plurality of test cells has exposed regions of the embedded phase shift layer adjacent to unattenuated feature regions having second attenuation.

10. (original) An apparatus comprised of a embedded attenuated phase shift mask, the embedded attenuated phase shift mask including a substrate, an embedded

phase shift layer having a predetermined thickness, and an opaque layer, the embedded phase shift mask having fabricated thereon a plurality of test cells, wherein one of the plurality of test cells has exposed regions of the embedded phase shift layer adjacent to unattenuated feature regions which has been trimmed to a thickness less than the predetermined thickness.

11. (original) The apparatus of claim 10, wherein the one of the plurality of test cells has exposed regions of the embedded phase shift layer adjacent to unattenuated feature regions, the exposed regions being to achieve a predetermined first level of attenuation, and wherein a second one of the plurality of test cells has exposed regions of the embedded phase shift layer adjacent to unattenuated feature regions having second attenuation.

12. (original) The apparatus of claim 10, wherein the one of the plurality of test cells includes unattenuated feature regions in which the substrate has been etched to a predetermined depth, and wherein a relative phase shift between the trimmed exposed regions of the embedded phase shift layer adjacent and the etched unattenuated feature regions is different than the phase shift between exposed phase shift layers and features in another one of the plurality of test cells.

13. (original) A method of optimizing phase shift layer parameters of a photomask having a phase shift layer, comprising:

forming on a photomask a plurality of test cell patterns, at least two of the plurality of test cell patterns having at least one different phase shift layer parameter;

fabricating a plurality of test cells on a semiconductor substrate using the photomask, the test cells on the semiconductor substrate corresponding to the plurality of test cells in the pattern; and

evaluating the test cells on the semiconductor substrate.

14. (original) The method of claim 13, further comprising selecting phase shift parameters for a production photomask based at least in part on the evaluation of the test cells.

15. (original) The method of claim 13, further comprising,

simulating forming at least a part of a pattern on a semiconductor substrate using a model of at least a part of the photomask; and

validating or correcting the photomask model based on the evaluation of the test cells.

16. (previously presented) An embedded attenuated phase shift mask comprising:

a layer of opaque material having a first pattern formed therein;

a layer of phase shift material having a second pattern formed therein underlying the layer of opaque material, the second pattern comprising at least one removed portion, at least one recessed portion and at least one non-recessed portion, the at least one non-recessed portion of the second pattern coinciding with the first pattern, the at least one recessed portion being recessed to a depth that is predetermined based on a desired transmittance of the mask; and

a substantially transparent substrate having a third pattern formed therein underlying the layer of phase shift material, the third pattern coinciding with the at least one removed portion of the second pattern and having a depth that is predetermined based on a desired phase shift of the mask.

17. (currently amended) The embedded attenuated phase shift mask of claim 1, wherein the opaque material ~~is selected from the group consisting of~~ comprises chrome ~~and~~ or MoSi.

18. (currently amended) The embedded attenuated phase shift mask of claim 1, wherein the phase shift material ~~is selected from the group consisting of~~ comprises molybdenum, titanium, silicon ~~and~~ or nitrogen.

19. (previously presented) An embedded attenuated phase shift mask comprising:

a plurality of test cells, each of the plurality of test cells having at least one phase shifting condition that differs from that of the other test cells, each of the plurality of test cells comprising:

a layer of opaque material having a first pattern formed therein;

a layer of phase shift material having a second pattern formed therein underlying the layer of opaque material, the second pattern comprising at least one removed portion, at least one recessed portion and at least one non-recessed portion, the at least one non-recessed portion of the second pattern coinciding with the first pattern; and

a substantially transparent substrate having a third pattern formed therein underlying the layer of phase shift material, the third pattern coinciding with the at least one removed portion of the second pattern.

20. (previously presented) The embedded attenuated phase shift mask of claim 19, wherein the at least one phase shifting condition is chosen from the group consisting of transmittance, phase shifting angle and tri-tone.

21. (previously presented) The embedded attenuated phase shift mask of claim 20, wherein the at least one phase shifting condition is transmittance, and the at least one recessed portion of the second pattern is recessed to a depth that is predetermined based on a desired transmittance of a corresponding test cell.

22. (previously presented) The embedded attenuated phase shift mask of claim 20, wherein the at least one phase shifting condition is phase shift angle, and the third pattern has a depth that is predetermined base on a desired phase shift angle of a corresponding test cell.

23. (previously presented) The embedded attenuated phase shift mask of claim 19, wherein the plurality of test cells are arranged in a matrix.

24. (previously presented) A method of forming an embedded attenuated phase shift photomask from a blank photomask, the blank photomask comprising a substrate, a phase shift layer formed over the substrate, and an opaque layer formed over the phase shift layer, the method comprising the steps of:

removing at least one first portion of the opaque layer and an at least one corresponding first portion of the phase shift layer to expose at least one portion of the substrate;

removing the exposed at least one portion of the substrate to a depth D_1;

removing at least one second portion of the opaque layer to expose at least one corresponding second portion of the phase shift layer; and

removing the exposed at least one second portion of the phase shift layer to a depth D_2 to achieve a desired transmittance of the phase shifting layer, the depth D_1 being predetermined based on the desired relative phase shift between the at least one portion of the substrate and the at least second portion of the phase shift layer.

25. (previously presented) The method of claim 24, wherein the depth D_2 of removal of the at least one second portion of the phase shift layer is determined by the following equation:

$$D_2 = D_0\left(1 - \frac{\ln T}{\ln T_0}\right)$$

wherein "D_0" denotes an initial phase shift layer thickness, "T" denotes a desired transmission of the phase shift layer at a wavelength λ, and "T_0" denotes an initial transmission of the phase shift layer at the wavelength λ.

26. (previously presented) The method of claim 25, wherein the exposed at least one portion of the substrate is further removed during the step of removing the exposed at least one second portion of the phase shift layer.

27. (previously presented) The method of claim 26, wherein the depth D_1 of removal of the exposed at least one portion of the substrate is determined by the following equation:

$$D_1 = \frac{\lambda}{2(n_2 - 1)}\left(1 - \frac{\Phi_0}{\pi}\frac{\ln T}{\ln T_0}\right) - \frac{r_2'}{r_1'}D_0\left(1 - \frac{\ln T}{\ln T_0}\right)$$

wherein "n_2" denotes an index of refraction of the substrate at the wavelength λ, "Φ_0" denotes a phase angle of the phase shift layer at the wavelength λ and at the initial phase shift layer thickness D_0, r_1' denotes an etch rate of the phase shift layer during the step of removing at least one first portion of the opaque layer and an at least one corresponding first portion of the phase shift layer, and r_2' denotes an etch rate of the

substrate during the step of removing the exposed at least one second portion of the phase shift layer.

28. (previously presented) A method of forming a semiconductor device comprising the steps of:

interposing an embedded attenuated phase shift mask between a semiconductor wafer and an energy source, wherein the embedded attenuated phase shift mask comprises:

a layer of opaque material having a first pattern formed therein;

a layer of phase shift material having a second pattern formed therein underlying the layer of opaque material, the second pattern comprising at least one removed portion, at least one recessed portion and at least one non-recessed portion, the at least one non-recessed portion of the second pattern coinciding with the first pattern, the at least one recessed portion being recessed to a depth that is predetermined based on a desired transmittance of the mask; and

a substantially transparent substrate having a third pattern formed therein underlying the layer of phase shift material, the third pattern coinciding with the at least one removed portion of the second pattern and having a depth that is predetermined based on a desired phase shift of the mask;

generating energy in the energy source;

transmitting the generated energy through the patterns formed in the opaque material layer, the phase shift material layer and the substrate of the embedded attenuated phase shift mask to the semiconductor wafer; and

etching an image on the semiconductor wafer corresponding to the patterns formed in the opaque material layer, the phase shift material layer and the substrate of the embedded attenuated phase shift mask.